

What is Claimed is:

- 1           1.       A medical storage device for visually indicating a temperature of a medical  
2 item contained therein comprising:  
3           a receptacle for containing said medical item having a particular temperature range  
4 for utilization; and  
5           a temperature sensor disposed in thermal relation with said medical item and  
6 including a plurality of temperature sensitive substances each associated with a  
7 corresponding temperature range within an overall range of 50° F - 150° F , wherein each  
8 said substance is responsive to a temperature of said medical item and provides a visual  
9 indication of said item temperature when said item temperature is within said corresponding  
10 temperature range.
- 1           2.       The medical storage device of claim 1 wherein said temperature sensor  
2 includes a temperature sensing strip providing a digital indication of said medical item  
3 temperature.
- 1           3.       The medical storage device of claim 1 wherein said receptacle includes an  
2 intravenous solution bag and said medical item includes an intravenous solution.
- 1           4.       The medical storage device of claim 3 wherein said temperature sensor is  
2 laminated to said intravenous solution bag.
- 1           5.       The medical storage device of claim 3 wherein said intravenous solution bag  
2 is encased in a liner, and said temperature sensor is disposed between said liner and said  
3 intravenous solution bag.
- 1           6.       The medical storage device of claim 1 wherein said receptacle includes a  
2 bottle.

1           7.       The medical storage device of claim 6 wherein said bottle includes a label and  
2       said temperature sensor is affixed to said label.

1           8.       The medical storage device of claim 2 wherein said medical item includes an  
2       intravenously delivered fluid, and said receptacle includes a fluid delivery tube of an infusion  
3       system for providing said medical fluid to a patient.

1           9.       The medical storage device of claim 1 wherein said medical item includes an  
2       intravenously delivered fluid, and said receptacle includes a holder of an infusion system for  
3       receiving a medical container of said intravenously delivered fluid and suspending said  
4       container from a support structure to facilitate infusion of said intravenously delivered fluid  
5       to a patient.

1           10.      The medical storage device of claim 1 wherein:  
2                said medical storage device is a thermal treatment system for thermally treating  
3       medical objects placed therein;  
4                said medical item includes a medical fluid and said receptacle includes a plurality of  
5       thermal treatment system compartments each for receiving a medical container having said  
6       medical fluid contained therein; and  
7                said medical storage device further includes a plurality of said temperature sensors,  
8       wherein each temperature sensor is disposed within a corresponding compartment in thermal  
9       relation with an associated medical container placed in that compartment and provides a  
10      visual temperature indication of medical fluid within said associated medical container.

1           11.      A medical device for visually indicating a temperature of a medical item  
2       placed therein comprising:  
3                a receptacle for receiving and securing said medical item within said device, wherein  
4       said medical item has a particular temperature range for utilization; and  
5                a temperature sensor disposed within said receptacle in thermal relation with said  
6       medical item and providing a visual indication of medical item temperature;

7            wherein said receptacle is configured to force said medical item against said  
8            temperature sensor to facilitate temperature measurement.

1            12.     The medical device of claim 11 wherein said temperature sensor includes a  
2            plurality of temperature sensitive substances each associated with a corresponding  
3            temperature range, wherein each said substance is responsive to a temperature of said  
4            medical item and provides a visual indication of said medical item temperature when said  
5            medical item temperature is within said corresponding temperature range.

1            13.     The medical device of claim 12 wherein said temperature sensor includes a  
2            temperature sensing strip providing a digital indication of said medical item temperature.

1            14.     The medical device of claim 11 further including:  
2            a base;  
3            a display panel attached to said base and having said temperature sensor disposed on  
4            an interior surface thereof;  
5            an item support attached to said base and displaced from said display panel to form  
6            said receptacle therebetween, wherein said display panel and item support secure said  
7            medical item within said receptacle and force said medical item against said temperature  
8            sensor; and  
9            a device support attached to said item support and said base for reinforcing said  
10           medical device.

1            15.     The medical device of claim 14 wherein said display panel further includes a  
2            handle to facilitate transport and handling of said medical device.

1            16.     The medical device of claim 11 further including:  
2            a base; and  
3            a securing member attached to said base and including said temperature sensor  
4            disposed on an interior surface thereof, wherein said securing member and said base form  
5            said receptacle therebetween, and wherein said securing member is configured to contour and

6 secure said medical item within said receptacle and force said temperature sensor against said  
7 medical item to facilitate temperature measurement.

1 17. The medical device of claim 11 wherein said medical device is attached to a  
2 support structure.

1 18. The medical device of claim 11 wherein said medical device is attached to a  
2 thermal treatment system.

1 19. The medical device of claim 11 wherein said temperature sensor includes a  
2 liquid crystal display.

1 20. The medical device of claim 11 wherein said temperature sensor includes a  
2 voice synthesizer to provide an audio indication of said medical item temperature.

1 21. The medical device of claim 11 wherein said temperature sensor includes an  
2 infra-red temperature sensor.

1 22. An apparatus for facilitating pressurized infusion of liquid from a liquid-filled  
2 container through a tube into a patient wherein said liquid-filled container is suspended from  
3 a support and said tube extends between said liquid-filled container and said patient, said  
4 apparatus comprising:

5 an inflatable pressure device for applying pressure to said liquid-filled container to  
6 facilitate flow of liquid from said liquid-filled container through the tube to the patient;

7 a receptacle for engaging said support and receiving said liquid-filled container and  
8 said inflatable pressure device, wherein said receptacle includes a temperature sensor for  
9 providing a visual temperature indication of said liquid, and wherein said inflatable pressure  
10 device is disposed within said receptacle adjacent said liquid-filled container; and

11 a pressure controller for regulating fluid pressure within and expansion of said  
12 inflatable pressure device to control pressure applied by said inflatable pressure device to

13 said liquid-filled container to generate a desired liquid flow rate from said liquid-filled  
14 container to the patient.

1 23. The apparatus of claim 22 further including:  
2 a heating element to heat said liquid-filled container; and  
3 a conductive plate to apply heat from said heating element to said liquid-filled  
4 container;  
5 wherein said pressure device is disposed within a bag having a pocket for receiving  
6 said heating element and said conductive plate such that said conductive plate is disposed  
7 between said liquid-filled container and said heating element to apply heat from said heating  
8 element to said liquid-filled container.

1 24. The apparatus of claim 22 wherein said temperature sensor includes a  
2 plurality of temperature sensitive substances each associated with a corresponding  
3 temperature range, wherein each said substance is responsive to a temperature of said liquid  
4 and provides a visual indication of said liquid temperature when said liquid temperature is  
5 within said corresponding temperature range.

1 25. The apparatus of claim 24 wherein said temperature sensor includes a  
2 temperature sensing strip providing a digital indication of said liquid temperature.

1 26. A temperature control system for heating medical items to desired  
2 temperatures comprising:  
3 a system housing;  
4 a heating chamber disposed within said housing for receiving at least one medical  
5 item and heating said at least one medical item to a desired temperature, wherein said heating  
6 chamber includes:  
7 at least one receptacle each for receiving a corresponding medical item and  
8 heating said corresponding medical item to said desired temperature;  
9 a temperature sensor disposed in each receptacle in thermal relation with and  
10 for providing a temperature indication of a corresponding medical item; and

11                   a heater for applying heat to said receptacle; and  
12                   a controller to facilitate entry of said desired temperature for said heating chamber  
13 and to control said heater to heat said at least one medical item to said desired temperature.

1           27.    The system of claim 26 wherein said temperature sensor includes a plurality  
2 of temperature sensitive substances each associated with a corresponding temperature range,  
3 wherein each said substance is responsive to a temperature of said medical item and provides  
4 a visual indication of said medical item temperature when said medical item temperature is  
5 within said corresponding temperature range.

1           28.    The system of claim 27 wherein said temperature sensor includes a  
2 temperature sensing strip providing a digital indication of said medical item temperature.

1           29.    A method of visually indicating a temperature of a medical item contained in  
2 a medical storage device comprising the steps of:

3           (a)    containing said medical item in a medical storage device receptacle, wherein  
4 said medical item has a particular temperature range for utilization; and

5           (b)    measuring and providing a visual indication of temperature of said medical  
6 item within said receptacle via a temperature sensor disposed in thermal relation with said  
7 medical item and including a plurality of temperature sensitive substances each associated  
8 with a corresponding temperature range within an overall range of 50° F - 150° F, wherein  
9 each said substance is responsive to a temperature of said medical item and provides said  
10 visual indication when said medical item temperature is within said corresponding  
11 temperature range.

1           30.    The method of claim 29 wherein said temperature sensor includes a  
2 temperature sensing strip, and step (b) further includes:

3           (b.1) measuring said medical item temperature and providing a digital indication of  
4 said measured temperature via said temperature sensing strip.

1           31.     The method of claim 29 wherein said receptacle includes an intravenous  
2 solution bag and said medical item includes an intravenous solution, and step (a) further  
3 includes:

4           (a.1)   containing said intravenous solution within said intravenous solution bag.

1           32.     The method of claim 31 wherein step (b) further includes:

2           (b.1)   laminating said temperature sensor to said intravenous solution bag.

1           33.     The method of claim 31 wherein step (b) further includes:

2           (b.1)   encasing said intravenous solution bag in a liner and disposing said  
3 temperature sensor between said liner and said intravenous solution bag.

1           34.     The method of claim 29 wherein said receptacle includes a bottle, and step (a)  
2 further includes:

3           (a.1)   containing said medical item within said bottle.

1           35.     The method of claim 34 wherein said bottle includes a label, and  
2 step (b) further includes:

3           (b.1)   affixing said temperature sensor to said label.

1           36.     The method of claim 30 wherein said medical item includes an intravenously  
2 delivered fluid and said receptacle includes a fluid delivery tube of an infusion system for  
3 providing said medical fluid to a patient, and step (a) further includes:

4           (a.1)   containing said intravenously delivered fluid within said fluid delivery tube.

1           37.     The method of claim 29 wherein said medical item includes an intravenously  
2 delivered fluid and said receptacle includes a holder of an infusion system for receiving a  
3 medical container of said intravenously delivered fluid and suspending said container from a  
4 support structure to facilitate infusion of said intravenously delivered fluid to a patient, and  
5 step (a) further includes:

6 (a.1) containing said medical container of said intravenously delivered fluid within  
7 said holder.

1 38. The method of claim 29 wherein said medical storage device is a thermal  
2 treatment system for thermally treating medical objects placed therein, said medical item  
3 includes a medical fluid and said receptacle includes a plurality of thermal treatment system  
4 compartments each for receiving a medical container having said medical fluid contained  
5 therein, said medical storage device further including a plurality of said temperature sensors,  
6 and step (b) further includes:  
7 (b.1) placing each temperature sensor within a corresponding compartment in  
8 thermal relation with an associated medical container placed in that compartment and  
9 providing a visual temperature indication of medical fluid within said associated medical  
10 container.

1 39. A method of visually indicating a temperature of a medical item placed in a  
2 medical device comprising the steps of:

3 (a) receiving and securing said medical item within a receptacle of said device,  
4 wherein said medical item has a particular temperature range for utilization; and

5 (b) measuring and providing a visual indication of medical item temperature via a  
6 temperature sensor disposed within said receptacle in thermal relation with said medical  
7 item, wherein said receptacle is configured to force said medical item against said  
8 temperature sensor to facilitate temperature measurement.

1 40. The method of claim 39 wherein said temperature sensor includes a plurality  
2 of temperature sensitive substances each associated with a corresponding temperature range,  
3 wherein each said substance is responsive to a temperature of said medical item, and step (b)  
4 further includes:

5 (b.1) measuring and visually indicating said medical item temperature via each  
6 temperature sensitive substance when said medical item temperature is within a  
7 corresponding temperature range of that substance.



1           41.    The method of claim 40 wherein said temperature sensor includes a  
2 temperature sensing strip, and step (b.1) further includes:

3           (b.1.1) measuring said medical item temperature and providing a digital indication of  
4 said measured temperature via said temperature sensing strip.

1           42.    The method of claim 39 wherein said medical device includes a base, a  
2 display panel, an item support displaced from said display panel to form said receptacle  
3 therebetween and a device support to reinforce said medical device, and step (a) further  
4 includes:

5           (a.1) securing said medical item within said receptacle via said display panel and  
6 item support; and

7           step (b) further includes:

8           (b.1) placing said temperature sensor on an interior surface of said display panel and  
9 forcing said medical item against said temperature sensor via said display panel and item  
10 support to facilitate temperature measurement.

1           43.    The method of claim 42 wherein said display panel further includes a handle, and  
2 step (a) further includes:

3           (a.1) transporting and handling said medical device via said handle.

1           44.    The method of claim 39 wherein said medical device further includes a base  
2 and a securing member attached to said base, wherein said securing member and said base  
3 form said receptacle therebetween, and step (b) further includes:

4           (b.1) placing said temperature sensor on an interior surface of said securing  
5 member; and

6           (b.2) contouring and securing said medical item within said receptacle via said  
7 securing member and forcing said temperature sensor against said medical item to facilitate  
8 temperature measurement.

1           45.    The method of claim 39 wherein step (a) further includes;

2           (a.1) attaching said medical device to a support structure.

- 1        46.    The method of claim 39 wherein step (a) further includes:
- 2        (a.1)   attaching said medical device to a thermal treatment system.